REMARKS

Applicants have amended their claims in order to further clarify the definition of various aspects of the present invention. Specifically, the independent claims in the application that are directed to a fiber-containing material, that is, claims 9, 30 and 67, are amended to recite that the fiber-containing material is a web or fabric by itself.

Moreover, Applicants are adding new claim 82 to the application. Claim 82, dependent on claim 67, recites that the material consists essentially of the multi-component fibers processed by the recited process.

In connection with the present claim amendments, note, for example, pages 4-6 of Applicants' specification; see also, for example, pages 17-19 of Applicants' specification.

Applicants respectfully submit that all of the claims now presented for consideration by the Examiner patentably distinguish over the teachings of the reference applied in rejecting claims in the Office mailed Action July 16, 2003, that is, the teachings of U.S. Patent No. 4,514,455 to Hwang, under the provisions of 35 USC §102 and 35 USC §103.

It is respectfully submitted that the teachings of the applied reference do not disclose, nor would have suggested, fiber-containing material as in the present claims, made from a plurality of multi-component fibers, with each of the multi-component fibers including at least first and second segments, the first segments of the plurality of multi-component fibers having cross-over points with each other, where the first segments cross each other, the second polymer material, of the second segments, having been melted and being substantially only at the cross-over

points where the first segments cross each other, to act as a binder of the fiber-containing material, and wherein the multi-component fibers have a size of at most 1 denier per fiber (dpf), and the fiber-containing material is a web or fabric by itself. See claim 30.

In addition, it is respectfully submitted that this reference would have neither taught nor would have suggested such fiber-containing material including multi-component fibers having at least the first and second segments, the second segments having been melted and being a binder of the fiber-containing material, with the first and second segments having been at least partially split from each other prior to melting of the second segments, the fiber-containing material having cross-over points of the first segments with each other, with the second polymer material, of the second segments, being substantially only at the cross-over points where the first segments cross each other, the multi-component fibers having a size of at most 1 denier per fiber (dpf), and wherein the fiber-containing material is a web or fabric by itself. See claim 9.

Furthermore, it is respectfully submitted that the reference as applied by the Examiner would have neither taught nor would have suggested such fiber-containing material as in the present claims, made by the process including collecting a plurality of multi-component fibers having first and second segments, the multi-component fibers having a size of at most 1 denier per fiber (dpf), splitting the second segments at least partially from the first segments, and, after the splitting, thermally bonding the first segments by melting the second polymer material of the second segments, the second polymer material of the second segments being melted so as encapsulate the first segments at cross-over points of the first segments, with the

first segments crossing each other at the cross-over points, and wherein after the thermal bonding the second polymer material of the second segments is substantially only at the cross-over points of the first segments where the first segments cross each other, the fiber-containing material being a web or fabric by itself. Note claim 67.

Moreover, it is respectfully submitted that this applied reference would have neither taught nor would have suggested the additional features of the present invention as in the dependent claims being considered on the merits in the above-identified application, including (but not limited to) wherein the post-split fibers (the resulting product after at least partially splitting - see claim 79, or completely splitting - see claim 80, the first and second segments from each other) have dpf values less than that of the multi-component fibers and as low as 0.01 dpf; and/or wherein the multi-component fibers are microfibers (see claim 15); and/or weight of the formed material (note claim 12); and/or wherein the second segments have been completely melted in forming the material (note, for example, claim 13); and/or wherein the second polymer material forming the second segments is the sole binder of the fiber-containing material (note claim 14); and/or wherein the second segments have been completely split from the first segments (see claim 20), or have been only partially split from the first segments (see claim 18); and/or wherein the fiber-containing material consists essentially of the multi-component fibers processed by the specified process (see claim 82).

The invention, as being considered on the merits in the present application, is directed to fiber-containing materials (for example, fibrous materials, such as woven fabrics, knit fabrics, yarns, webs and nonwoven fabrics). It has long been desired to

provide bonded fibrous materials, including nonwoven materials, having increased strength and increased softness. According to various techniques for forming such bonded fibrous materials, a binder fiber is utilized having an adhesive sheath, which is softened so as to bind fibers thereto after the softened adhesive has hardened. Note, for example, page 1, line 19 to page 2, line 14, of Applicants' specification. In this structure, there is excessive adhesive, and there is undesirable bonding of more than just the cross-over points (that is, potential bonding sites) of the structure.

It has also been known to use standard size binder fibers which are melted, forming melted adhesive, to provide the bonded structure. However, an excessive amount of binder at one spot occurs, as described in the paragraph bridging pages 2 and 3 of Applicants' specification.

Fiber structures composed wholly or in part of completely or partially split multi-component fibers are known, and it was known to bond the fibers at the points of intersection through application of heat. Note the last full paragraph on page 3, and the paragraph bridging pages 3 and 4, of the present specification.

However, in prior techniques, with improved (increased) strength there occurred decreased softness, and with increased softness there occurred decreased strength. Thus, it was still desired to provide fibrous material having both improved strength and softness, with less wasted binder material.

It has also been desired to provide fiber-containing material having a higher surface area and smaller pore size, and having additional features as discussed previously. Such structure can be achieved, for example, in using fibers having relatively small denier size (for example, having a denier of one or less). It has been difficult to form fiber-containing material with fibers of such a small size, since it is

very expensive to make the smaller fibers, for example, because of the cost of the die having very small holes for extrusion; and also due to small diameter fibers being very fragile, for example, when being carded in a web-forming process or being extruded in the fiber-forming process.

Against this background, Applicants provide fiber-containing material having the desired improvement in both strength and softness simultaneously, which due thereto can be used by itself, as, e.g., a web or fabric, and wherein the fiber-containing material can have a high surface area and small pore size. Applicants can utilize small fibers in the fiber-containing material.

Applicants have found that utilizing multi-component fibers including at least first and second segments respectively of first and second polymer materials of different melt temperatures, especially with the segments being at least partially split from each other, and with the lower melt temperature polymer material (that is, polymer material of the second segments) being melted to provide a binder of the fiber-containing material, the melted second polymer material, of the second segments, being substantially only at the cross-over points of the first segments of first polymer material of higher melt temperature, e.g., encapsulating the cross-over points, objects according to the present invention are achieved. That is, a fiber-containing material of high strength and of good softness is achieved. Such fiber-containing material can be used by itself (that is, not as part of a composite) as a web or fabric. With the binding polymer material, of the second segments, being melted and being substantially only at the cross-over points of the first segments (especially, in encapsulating the cross-over points), improved strength is achieved with use of less binder. Furthermore, with the melted second polymer material

substantially only at the cross-over points where the first segments cross each other, there is less binder material waste; and, moreover, softness is improved. In addition, because more bonding sites are formed, e.g., at the cross-over points of the first segments, a more even appearance is achieved. Note, in particular, the sole full paragraph on page 24, and the paragraph bridging pages 24 and 25, of Applicants' specification. Note, also the paragraph bridging pages 8 and 9 of Applicants' specification.

In addition, the present invention uses multi-component fibers, which are subsequently split and thereafter wherein the second segments are melted and become a binder of the fiber-containing material. Through use of the multi-component fibers, during a large part of the processing in forming the fiber-containing material relatively large-size fibers, as compared with the size of the segments, are processed, so that the dies for extrusion can be relatively large (and thus relatively inexpensive), while the multi-component fibers formed are relatively sturdy and sufficiently strong for the fiber-forming and material-forming processes. Thus, a product with smaller denier fibers (i.e., the segments) can be formed, easily and relatively inexpensively.

Hwang discloses a composite nonwoven fabric particularly suited for use as an apparel insulating interliner, which includes a batt of staple polyester fibers that is attached to a nonwoven sheet of continuous polyester filaments. See column 1, lines 10-13. Note also column 2, lines 54-61. This patent discloses that in addition to light and heavy staple fibers, the batt optionally may include as much as 15% or more of binder fibers; and that upon heat treatment at temperature above their melting point, the binder fibers loose their identity as fibers by coalescing on the

surfaces or at the cross-overs of the other fibers to bond the batt. This patent discloses that the bonding, though not necessary, enhances the dimensional stability of the staple fiber batt. See column 4, lines 5-12. Note also that this patent requires attachment of the batt to a nonwoven sheet of polyester continuous filaments in a particular way (see column 3, lines 33-37); and specifies that the binder preferably is activated by heating the batt after it has been stitched to the nonwoven sheet, although the batt may be bonded at an earlier stage. See column 5, lines 27-31.

Note that Hwang discloses that upon heat treatment, the binder fibers lose their identity as fibers by coalescing on the surfaces or at the cross-overs of the other fibers to bond the batt. Clearly, this disclosure in Hwang would have neither taught nor would have suggested, and in fact would have taught away from, the presently claimed subject matter, including wherein the second polymer material, of the second segments, is substantially only at the cross-over points where the first segments cross each other, and especially encapsulate the first segments at the cross-over points.

The contention by the Examiner in Item 7 on page 4 of the Office Action mailed July 16, 2003, that according to Hwang the binder fibers are heated "so that they lose their identity and coalesce at the cross-over points of the other fibers", the Examiner pointing to column 4, lines 5-10 of Hwang, is noted. It is respectfully submitted, however, that under the requirements of 35 USC §102 and §103 the teachings of the references as a whole must be considered. The simple fact is that Hwang expressly discloses that the binder fibers coalesce on the surfaces or at the cross-overs of the other fibers. Such disclosure, as a whole, would have taught away from the presently claimed subject matter, having the second polymer material

substantially only at the cross-over points where the first segments cross each other, especially where the second polymer material encapsulates the cross-over points.

It is respectfully submitted that due to the processing according to the present invention, a structurally different product is produced according to the present invention, as compared with the structure formed in Hwang. In this regard, note that according to the present invention a soft and strong fabric/web is achieved, which can stand by itself as a fabric or web. In contrast, Hwang discloses a composite fabric wherein the batt "must be attached to a nonwoven sheet of polyester continuous filaments in a particular way". See column 3, lines 33-37 of Hwang. Clearly, a different product is produced using the multi-component fibers that are processed, according to the processing of the present claims, than the structure of Hwang, and it is respectfully submitted that the structure of Hwang would have neither disclosed nor would have suggested the presently claimed product.

In this regard, it is noted that the present claims recite that the fiber-containing material is a web or fabric by itself. Contrast this with Hwang, which, as quoted previously, requires the batt to be attached to a nonwoven sheet of polyester continuous filaments in a particular way. Clearly, Hwang would have neither disclosed nor would have suggested, and would have taught away from, the presently claimed fiber-containing material, including wherein the material is a web or a fabric by itself; and/or wherein the fiber-containing material consists essentially of the multi-component fibers processed by the recited process (see claim 82).

The contention by the Examiner in the paragraph bridging pages 4 and 5 of the Office Action mailed July 16, 2003, that the teachings of Hwang, that the binder should be located at the cross-over points, "is a sufficient teaching to produce a final

product with the binder located substantially at the cross-over points" is noted. It must be emphasized, however, that the present claims do not merely recite location of the binder "substantially" at the cross-over points, but rather recite that the second polymer material is substantially only at the cross-over points where the first segments cross each other. Moreover, and as discussed previously, the Examiner's interpretation of Hwang flies in the face of, and is directly contrary to, the express teachings of Hwang, that the material of the binder fibers coalesce, inter alia, on the surfaces of the other fibers. Clearly, the Examiner must consider the teachings of the reference as a whole; and, the teachings of this reference as a whole fairly discloses coalescing of the material of the binder fibers, inter alia, on the surfaces of the other fibers, teaching away from the present invention wherein the second polymer material, of the second segments, is substantially only at the cross-over points where the first segments cross each other.

The additional contention by the Examiner in the paragraph bridging pages 4 ad 5 of the Office Action mailed July 16, 2003, that Applicants' argument with respect to the time and temperature to teach how to produce binder at the cross-over points implies that Applicants' own specification is flawed, is respectfully traversed. Again, it is emphasized that the present claims recite that the binder is located substantially only at the cross-over points, directly contrary to the teachings of Hwang which disclose binder coalescing on the surfaces of the other fibers. Following the teachings of Hwang as a whole, such teachings would not have taught nor would have suggested, and in fact would have taught away from, the presently claimed invention, including the second polymer material, of the second segments,

substantially only at the cross-over points where the first segments cross each other, and advantages thereof.

Again, it is emphasized that by the present invention, having structure as claimed including the second polymer material, of the second segments, substantially only at the cross-over points, advantages of increased strength, as well as increased softness, is achieved. Such increased strength, for example, provides for the fiber-containing material to be a web or fabric by itself, as recited in the present claims. Compare with Hwang, which requires the batt to form part of a composite nonwoven fabric, with the batt attached to a nonwoven sheet of polyester continuous filaments in a particular way. Clearly, Hwang would have neither taught nor would have suggested the present invention, and advantages thereof.

The contention by the Examiner that Hwang discloses binder "collecting" at the cross-over points is a misinterpretation of the teachings of Hwang. That is, Hwang discloses coalescing of material of the binder fibers on the surfaces or at the cross-overs of the other fibers, and does not disclose, nor would have suggested, any "collecting" at the cross-overs, as alleged by the Examiner. It is respectfully submitted that Hwang does not focus on providing binder substantially only at the cross-over points, or advantages achieved thereby as discussed previously, including increased strength and softness, and wherein the fiber-containing material can stand by itself as a web or fabric. Clearly, Hwang would have taught away from that aspect of the present invention wherein the fiber-containing material is a web or fabric by itself, as in all of the present claims.

The contention by the Examiner in the paragraph bridging pages 5 and 6 of the Office Action mailed July 16, 2003, that the claims do not exclude that the

nonwoven fabric is attached to an additional layer, is noted. As presently amended, the claims recite that the fiber-containing material is a web or fabric by itself; as discussed previously, it is respectfully submitted that Hwang, which requires the batt to be attached to a nonwoven sheet of polyester continuous filaments in a particular way, would have taught away from this aspect of the present invention.

The dismissal by the Examiner of the step of splitting the multi-component fibers prior to melting, as a method limitation which is not given any patentable weight, is respectfully traversed. Where the processing provides a different product than that in the prior art, the processing must be given weight in determining patentability. See In re Luck, 177 USPQ 523, 525 (CCPA 1973). Under the present circumstances, it is respectfully submitted that Applicants have provided clear reasoning as to a more intimate mixture of the first and second segments achieved according to the present invention, including splitting the multi-component fibers prior to melting, achieving, after melting, excellent location of the second binder material, as recited in the present claims. Moreover, utilizing the multi-component fibers, particularly of a size according to the present invention, advantages are achieved as compared to the prior art, in that by splitting the multi-component fibers after depositing the fibers and prior to melting, lower denier fibers, (i.e., the segments of the multi-component fibers) can be provided, and a product having a higher surface area and a smaller pore size can be achieved. In view thereof, and particularly in view of the difference in structure achieved according to the present invention, it is respectfully submitted that the Examiner errs in failing to give any weight to the structure formed by splitting the multi-component fibers prior to melting.

Reference by the Examiner to the patent documents to Marshall (4,083,913), Peoples (4,568,581) and Geary et al. (EP 555,345), in the paragraph bridging pages 4 and 5 of the Office Action mailed July 16, 2003, is noted. Such reference to these patent documents, in an anticipation rejection under 35 U.S.C. §102, is inappropriate.

In addition, it is noted that these three patent documents are not listed in the formal statement of the rejection. Moreover, combinability of the teachings of these references with the teachings of Hwang, which is required under 35 U.S.C. §103, has not been provided by the Examiner. Clearly, reliance by the Examiner on these references, without making these references a formal part of the rejection, is improper. See In re Hoch, 166 USPQ 406, 407 n.3 (CCPA 1970).

The contention by the Examiner that the heated binder material would not only inherently bead up upon heating but will also inherently be substantially located only at the cross-over points of the fibers in the nonwoven material, based upon teachings of Marshall, Peoples and Geary, et al., is noted. It is respectfully submitted that various factors, including, for example, temperature of heating and time of heating, would influence the final product. Again, it is respectfully submitted that based upon the teaching of Hwang as a whole, the Examiner has not established inherency with respect to location of the binder material, especially in light of the express disclosure in Hwang of coalescing of binder material, inter alia, on the surfaces of the other fibers.

Allowance by the Examiner of claim 81, in the Office Action mailed July 16, 2003, is noted. The Examiner has indicated that claim 81 is allowable "since the prior art fails to teach producing yarns with binder material located at the cross-

over points of the fibers". It is respectfully submitted that this prior art also fails to teach fiber-containing material which is a web or fabric by itself, formed as set forth in the present claims including use of the multi-component fibers, and wherein the second polymer material, of the second segments, is substantially only at the cross-over points where the first segments cross each other, the multi-component fibers having a size of at most 1 denier per fiber.

In the present Amendment, Applicants have cancelled non-elected claims 32-54 without prejudice or disclaimer, and, in particular, without prejudice to the filing of a Divisional application directed to the subject matter thereof.

In view of the foregoing comments and amendments, entry of the present amendments, and reconsideration and allowance of all claims remaining in the application, are respectfully requested.

To the extent necessary, Applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to the Antonelli, Terry, Stout & Kraus, LLP Deposit Account No. 01-2135 (Docket No. 709.36924X00), and please credit any excess fees to such Deposit Account.

Respectfully submitted,

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